City of Fairfax
Watershed Management Plan

Public Meeting No. 1

November 13, 2002

The Louis Berger Group, Inc.

Outline

- Watershed Management Plan
- Objectives of the City of Fairfax Watershed Management Plan
- Study Elements
  - Stormwater Infrastructure Survey
  - Stream Assessment
  - Technical Approach Development
- Next Steps

Watershed Management Planning

Is an effort to coordinate and integrate the programs, tools, resources, and needs of multiple stakeholder groups within a watershed to conserve, maintain, protect, and restore the habitat and water quality of a watershed.

Watershed Management Plan

Is a detailed vision and strategy, at the small watershed level, to achieve watershed management.

Problem: Stormwater Runoff

- Changes in land use due to urbanization leads to:
  - Higher runoff volumes
  - Higher Flow rates
  - Shorter lag time

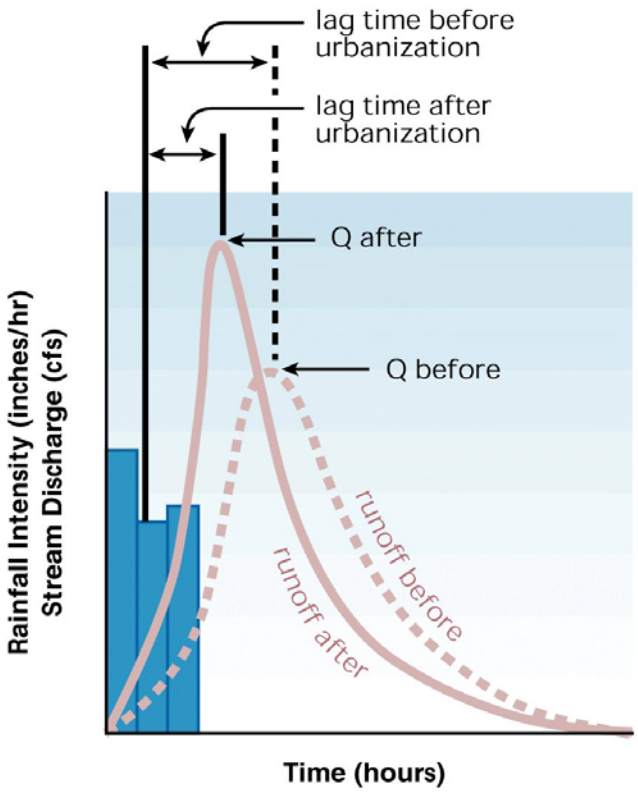


Fig. 1.15 -- A comparison of hydrographs before and after urbanization. The discharge curve is higher and steeper for urban streams than for natural streams.
In Stream Corridor Restoration: Principles, Processes, and Practices (10/98).
Interagency Stream Restoration Working Group (15 federal agencies)(FISRWG).

City of Fairfax WMP

- Goals and objectives:
  - Identification and evaluation of stormwater runoff and stream degradation
  - Determination and evaluation of the effectiveness of management measures for the reduction of stormwater runoff
  - Reestablishment of stream stability
  - Evaluation of current stormwater management efforts
  - Recommendation of scope and direction of future stormwater management program
  - Identification of potential funding sources
  - Development of public outreach materials including citizen awareness programs (water conservation, LID)

Study Elements

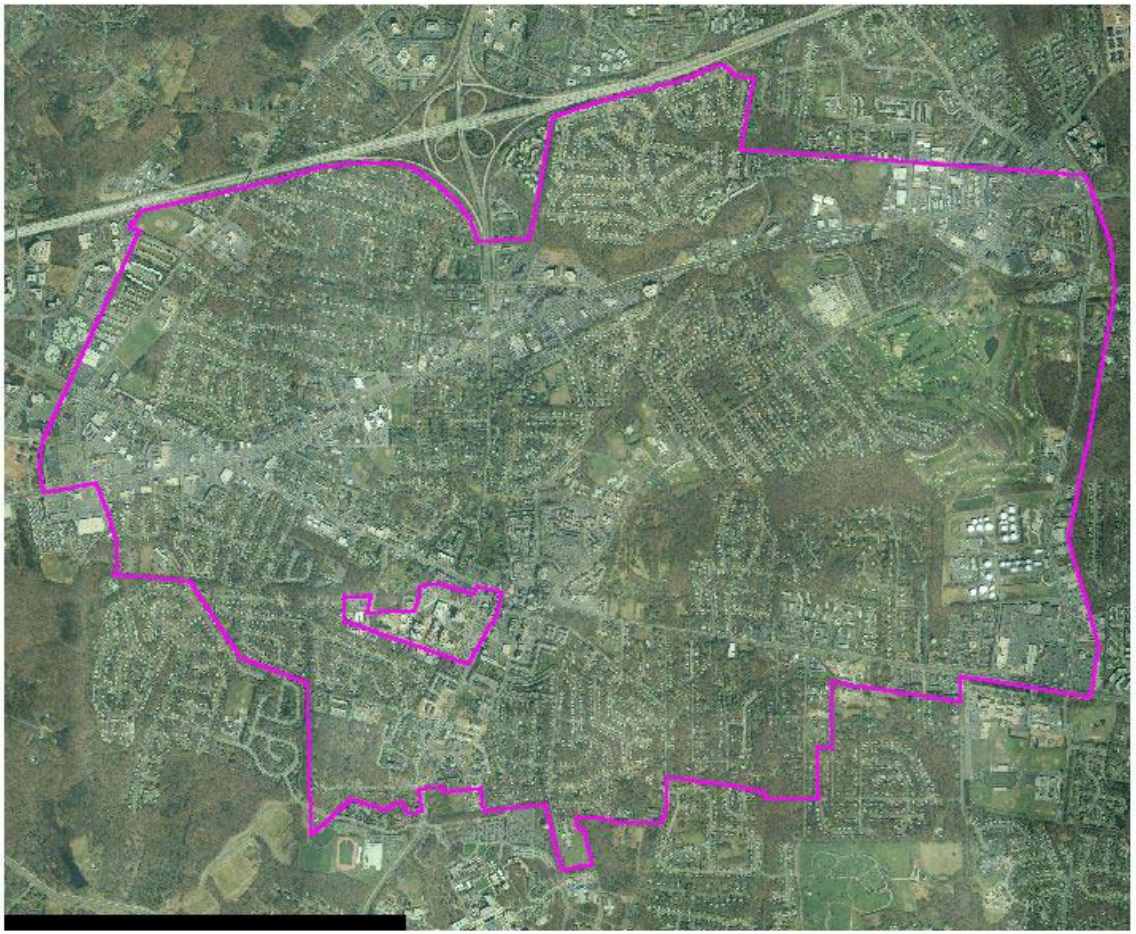
1. Existing conditions characterization
2. Field assessment
3. Technical approach to estimate stormwater flows
4. Stormwater management needs assessment
5. Stakeholder/public involvement
6. Implementation of stormwater control measures

1. Existing Conditions Characterization

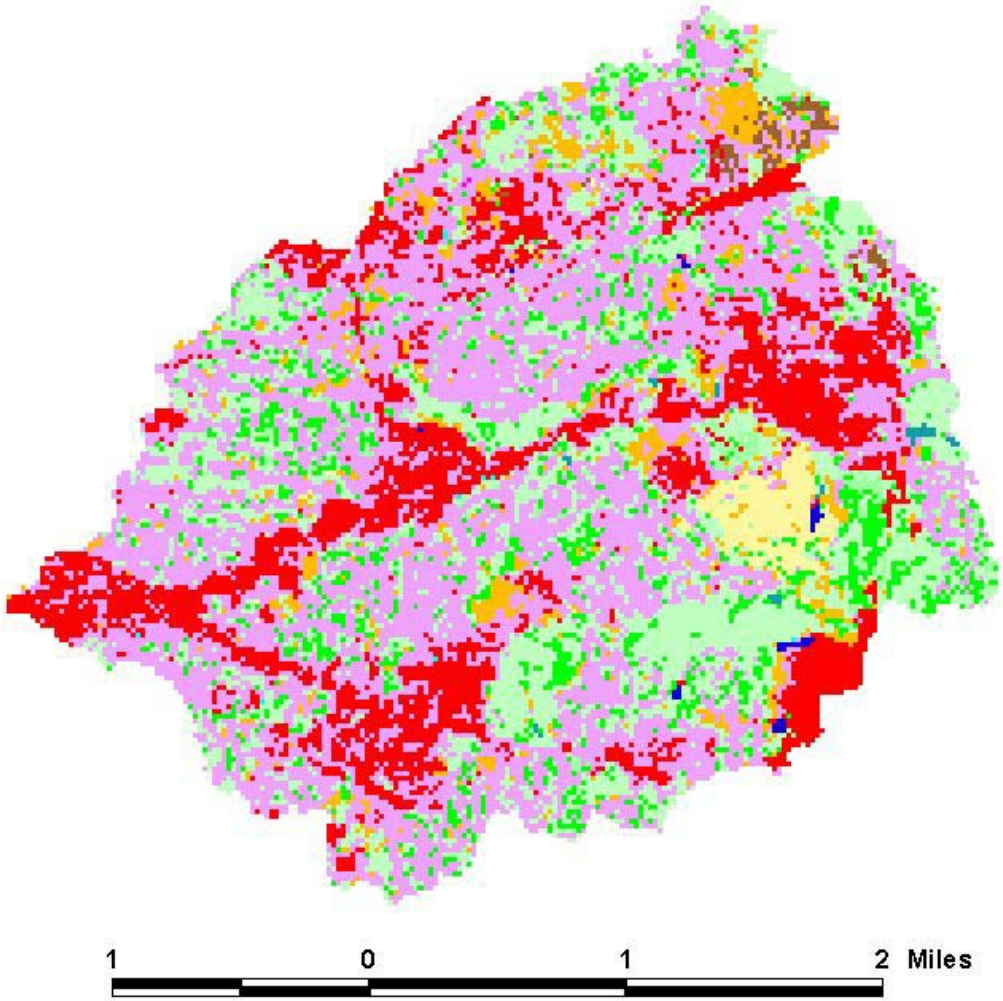
Watershed Characterization:

- Physical features (size, topography, and soils)
- Land use/ land cover
- Natural resources (stream corridors, forest cover, riparian buffers, and wetlands)

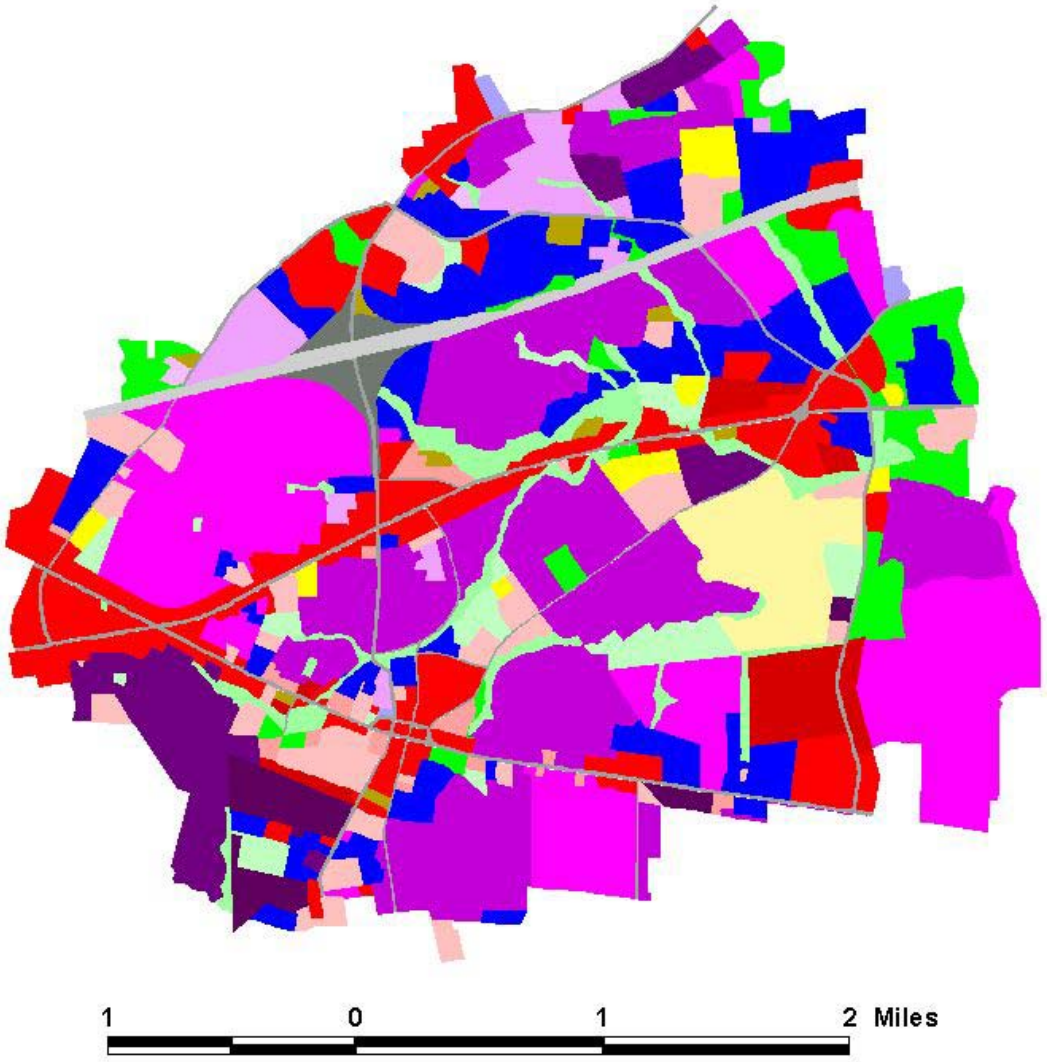
City of Fairfax



City of Fairfax - National Land Cover Data



City of Fairfax - Existing Land Use



Existing Land Use
- Commercial
- Industrial
- Office
- Institutional
- Highway Interchange
- Road-Curb&Gutter
- Road-including ROW
- RES-2ac
- RES-1ac
- RES-1/2ac
- RES-1/3ac
- RES-1/4ac
- RES-1/8ac
- Apartments/Condos
- Townhouses
- Open
- Golf Course
- Athaletic Fields
- Parkland
- Preservation
- Woods

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2. Field Assessments

- Stormwater Infrastructure Survey
- Stream Visual Assessment

Stormwater Infrastructure Survey (1/3)

- Objective is to inventory and characterize the city existing stormwater collection and conveyance system and to develop GIS mapping of the system.
- Initiated February 2002
- Surveyed 3000 structures so far

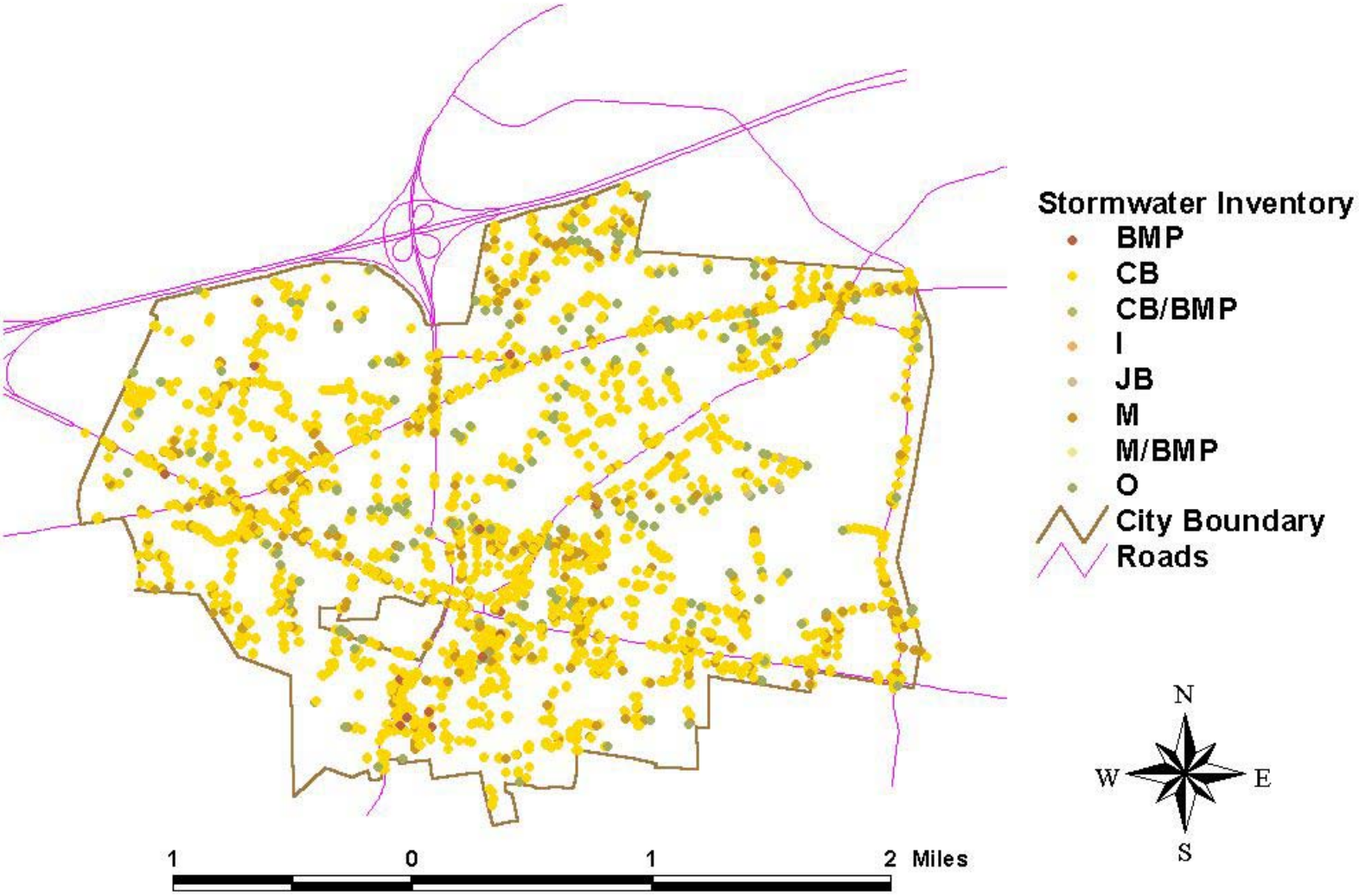
Stormwater Infrastructure Survey (2/3)

- Data collection:
  - Identification of the location of each inlet and outfall in the stormwater system.
    - Pipe diameter
    - Pipe composition
    - Pipe inlet and outlet condition
    - Direction of flow
  - Location of stormwater retention structures

Stormwater Infrastructure Survey (3/3)

- Product:
  - Database to house the stormwater structures inventory and characterization
  - GIS layer showing the stormwater structures
  - GIS layer showing the connectivity of the stormwater structures

City of Fairfax - Stormwater Inventory



Stream Assessment (1/2)

- Objective is to assess the health of the streams within the boundary of the City of Fairfax.
- Physical assessment based on the USDA protocols.

Stream Assessment (2/2)

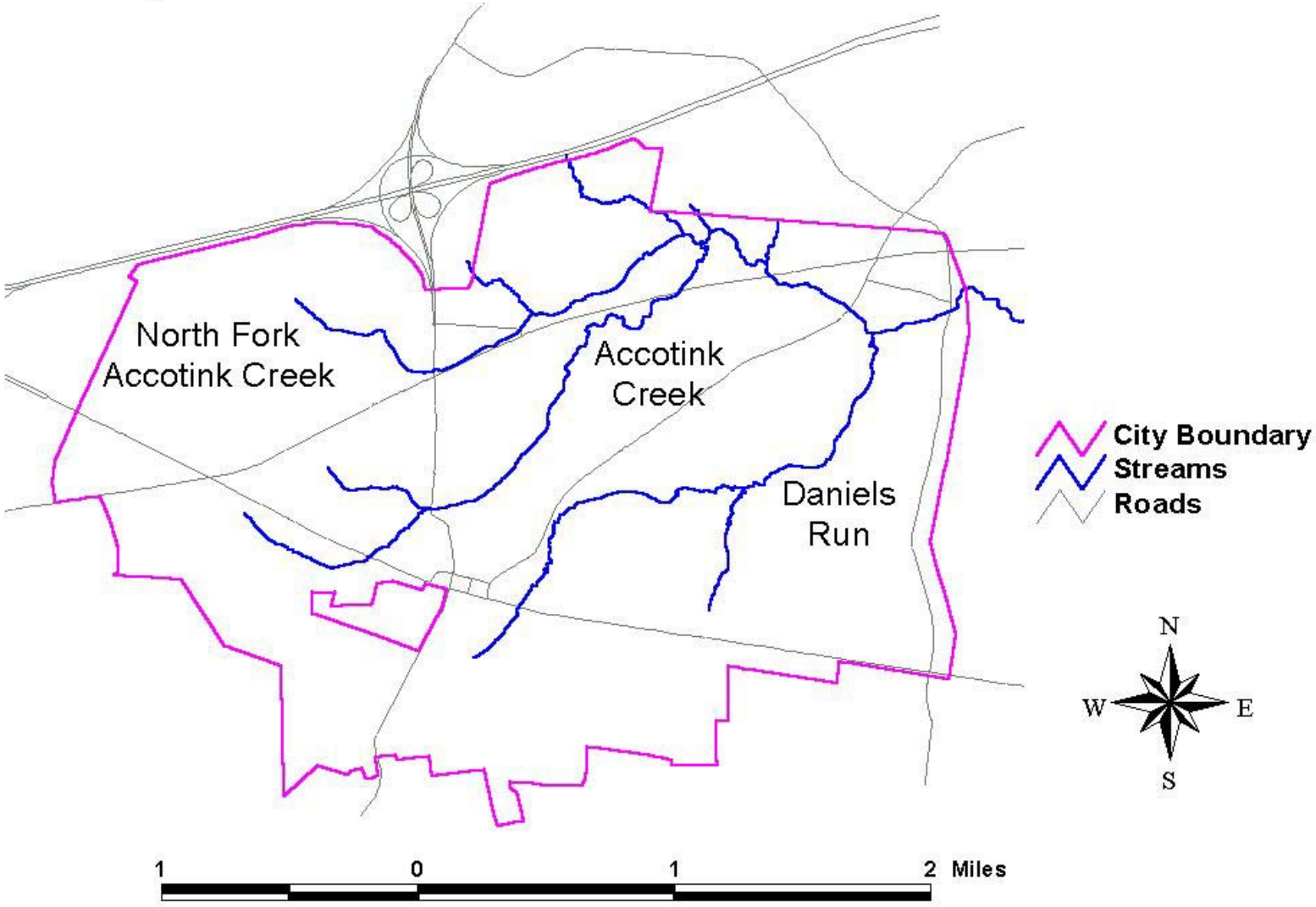
- Data collection:
  - Channel Condition
  - Hydrologic Alteration
  - Riparian Zone
  - Vegetative Protection
  - Bank Stability

  } Physical Conditions

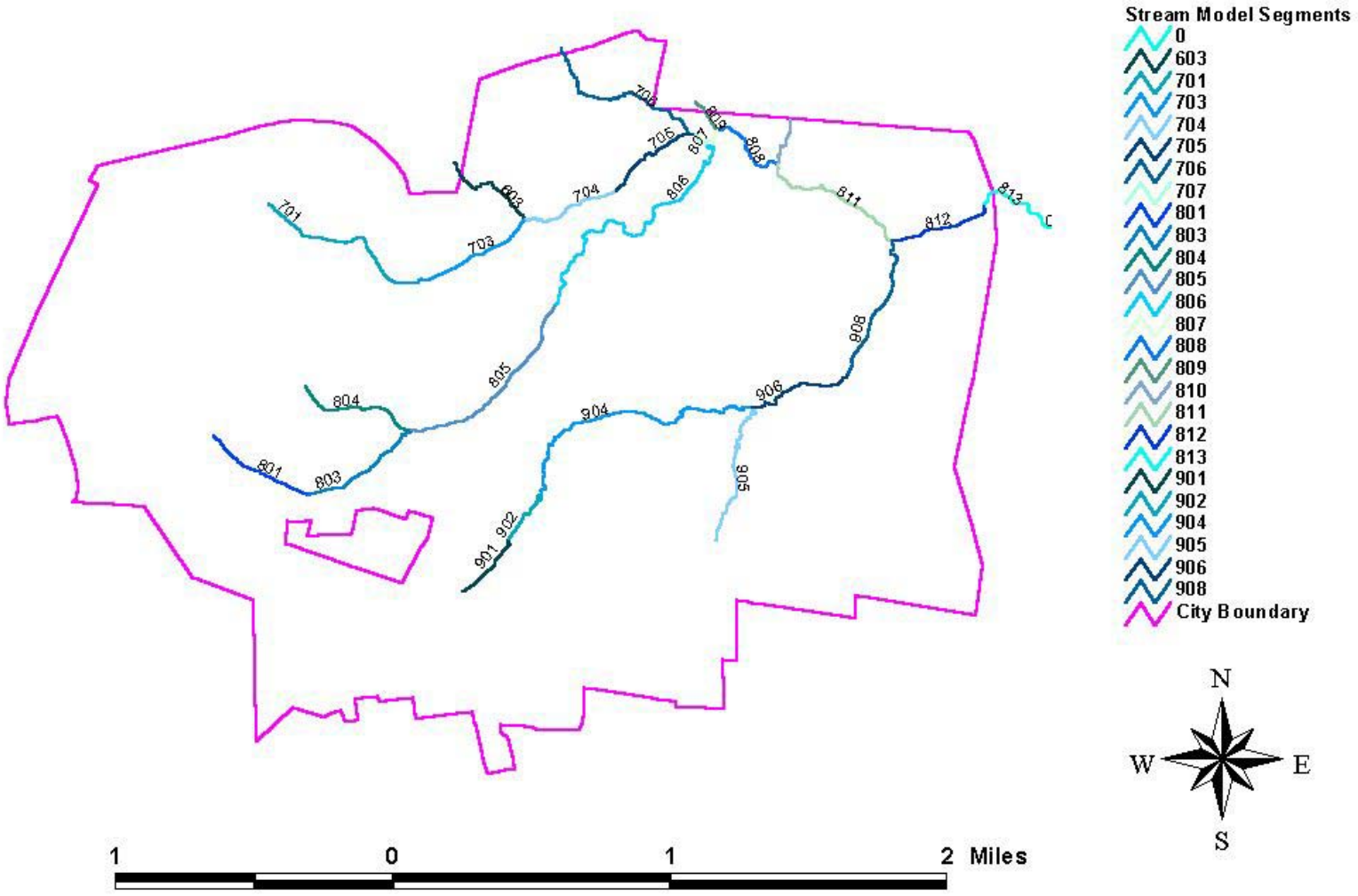
  - Sediment Deposition
  - Water Appearance
  - Nutrient Enrichment
  - Barriers to Fish Movement
  - Instream Fish Cover
  - Pools
  - Insects/Invertebrate Habitat
  - Canopy Cover
  - Riffle Embeddedness
  - Macroinvertebrates observed
  - Trash

  } Biological and Habitat Conditions

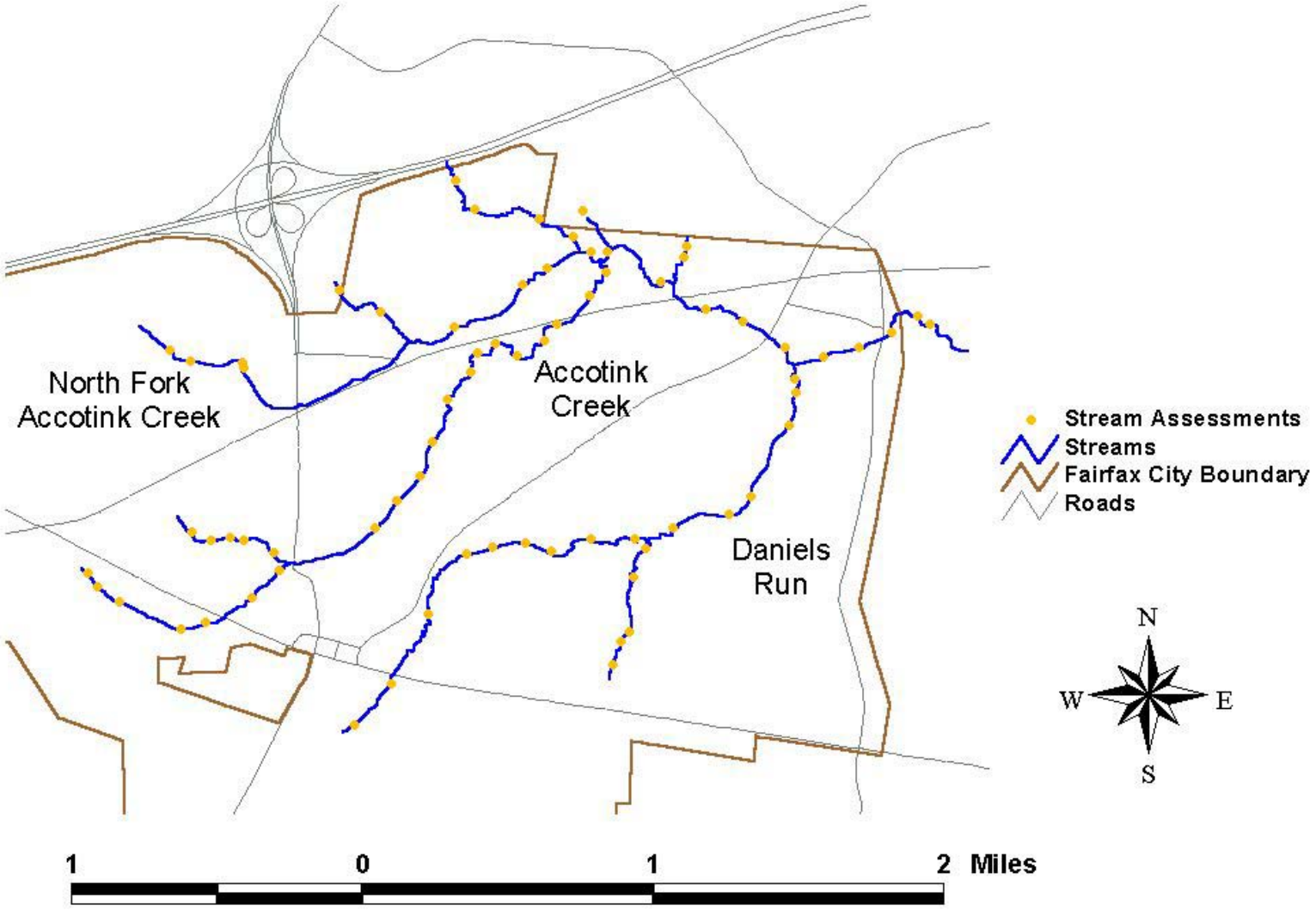
City of Fairfax - Stream Network



City of Fairfax - Model Segmentation



City 0f Fairfax - Stream Assessment

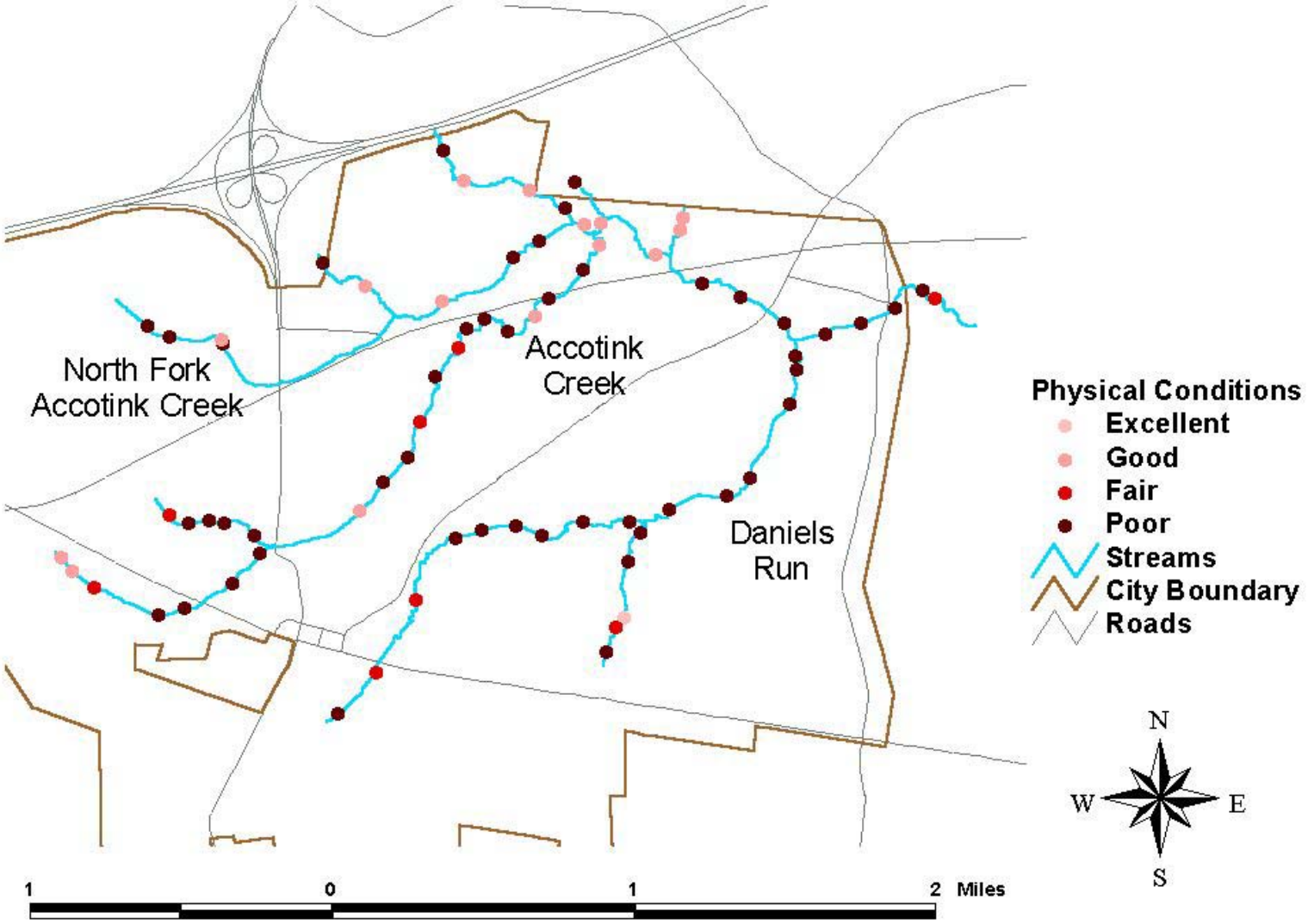


Stream Physical Conditions

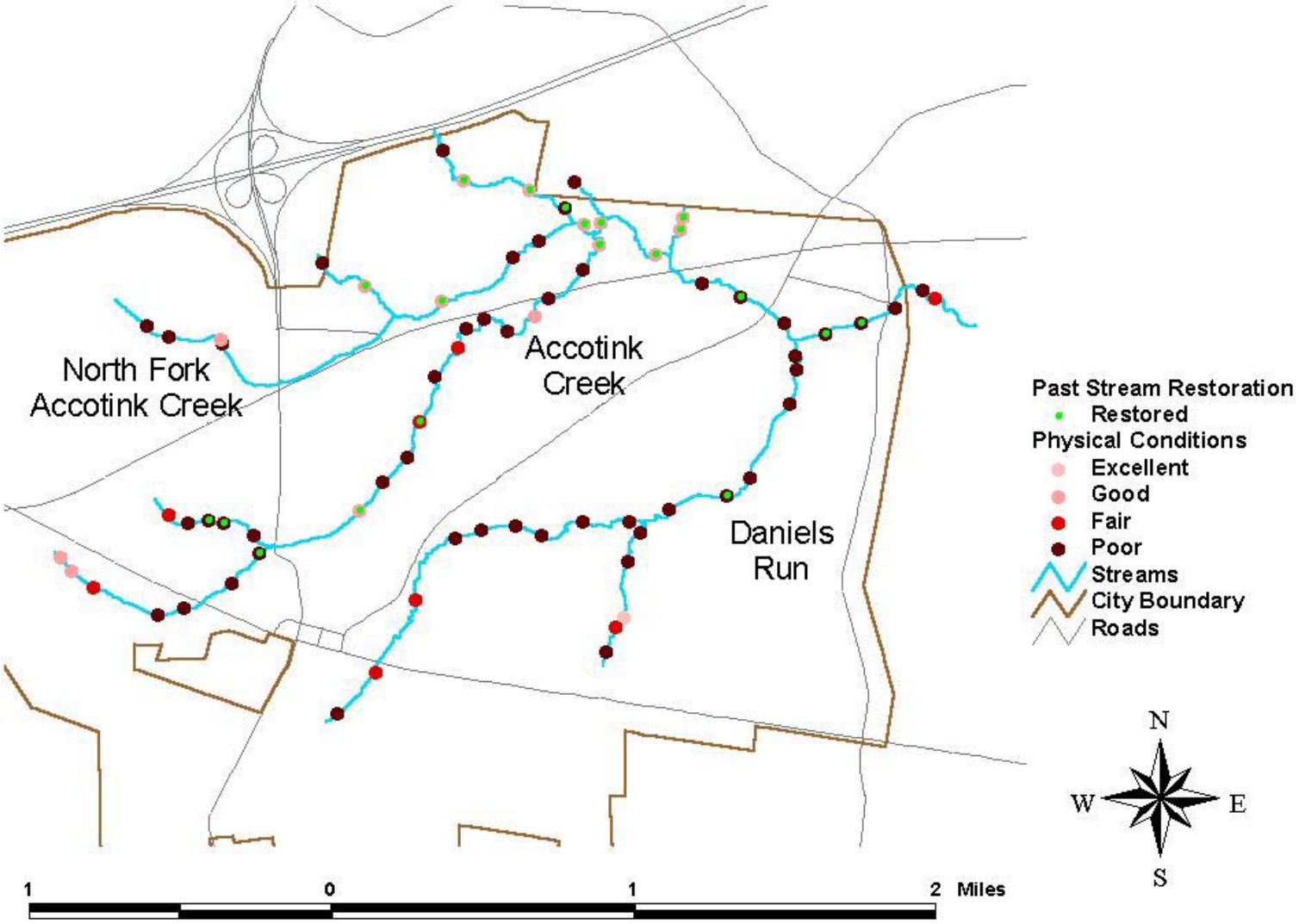
- Physical Stream and Channel Conditions
  - Bank Stability
  - Hydrologic Alteration
  - Riparian Zone
  - Vegetative Protection

Condition	Stream Linear Feet	%
Excellent	300	1
Good	13,730	26
Fair	5,000	9
Poor	34,580	65
Total	**53,610**	**100**

Stream Assessment - Physical Conditions



Stream Assessment - Physical Conditions and Restoration



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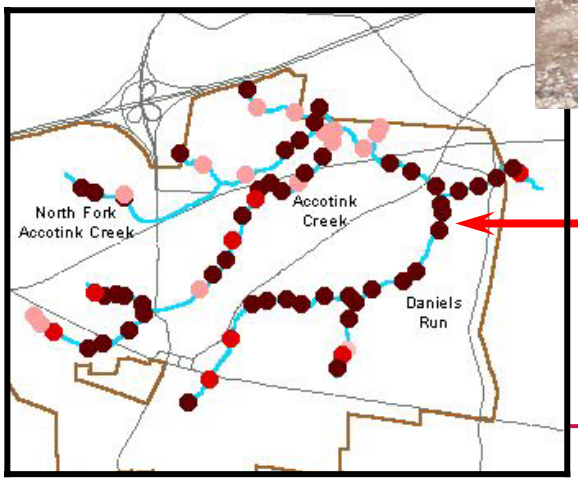

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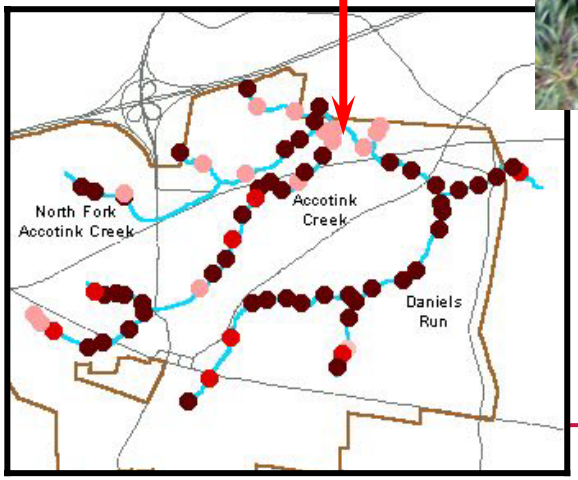

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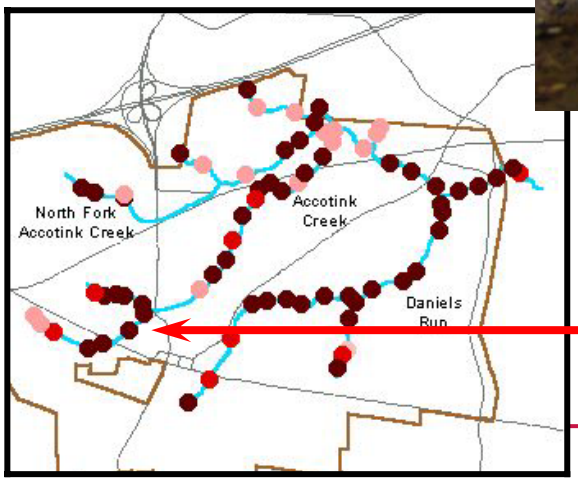
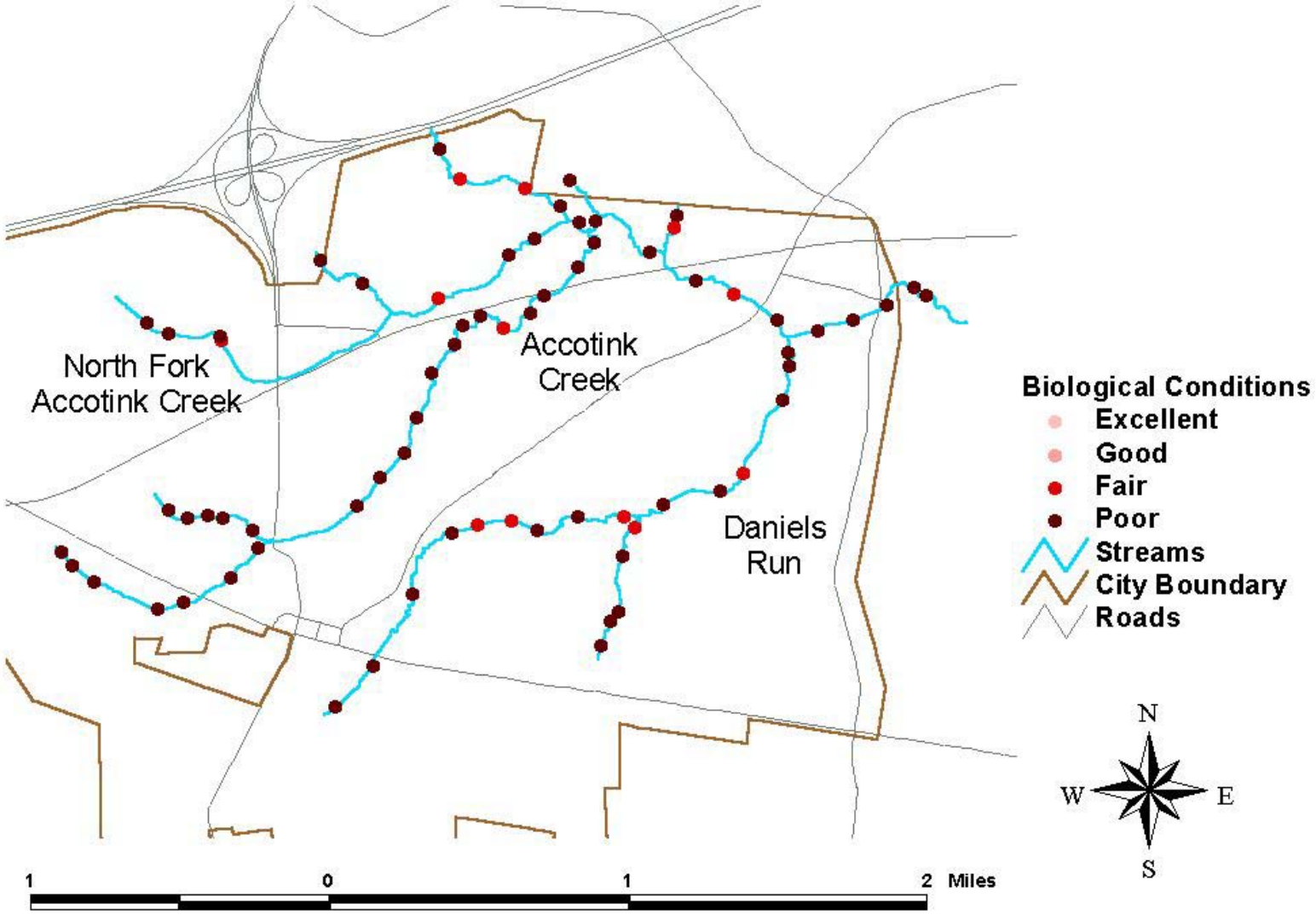


Biological and Habitat Conditions

- Biological and Habitat Conditions:
  - Sediment Deposition
  - Water Appearance
  - Nutrient Enrichment
  - Barriers to Fish Movement
  - Instream Fish Cover
  - Pools
  - Insects/Invertebrate Habitat
  - Canopy Cover
  - Riffle Embeddedness
  - Macroinvertebrates observed

Condition	Stream Linear Feet	%
Excellent	0	0
Good	0	0
Fair	10,900	20
Poor	42,710	80
Total	**53,610**	**100**

Stream Assessment - Biological Conditions



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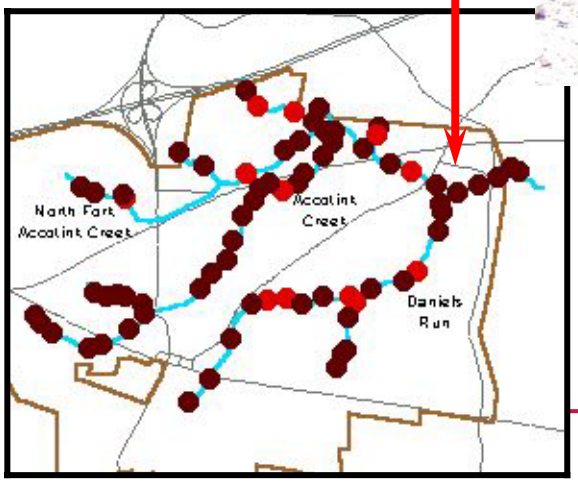
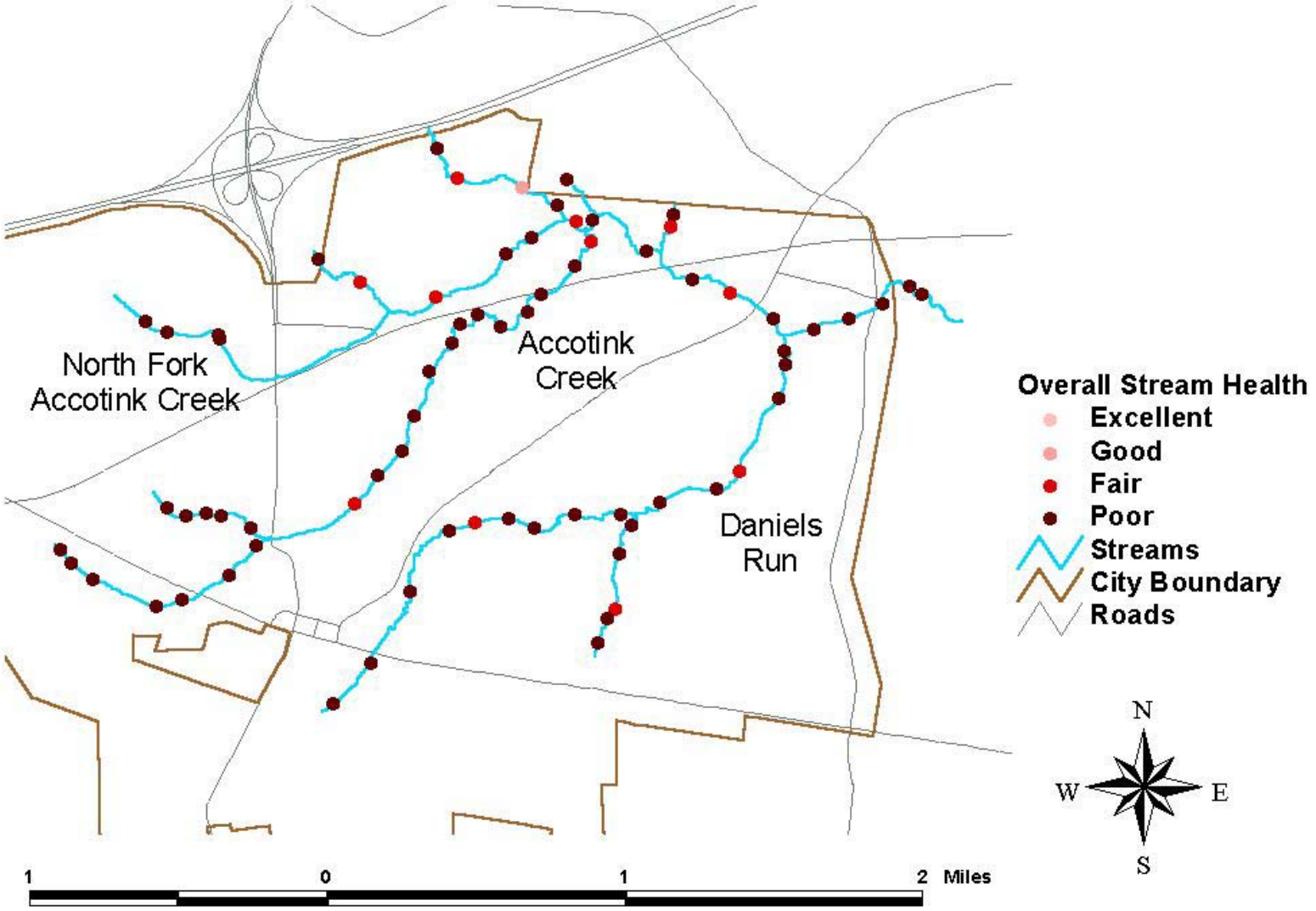


Overall Streams Health

- Based on the:
  - Physical Conditions
  - Biological and Habitat Conditions

Condition	Stream Linear Feet	%
Excellent	0	0
Good	1,350	3
Fair	10,900	20
Poor	41,360	77
Total	**53,610**	**100.0**

Stream Assessment - Overall Stream Health



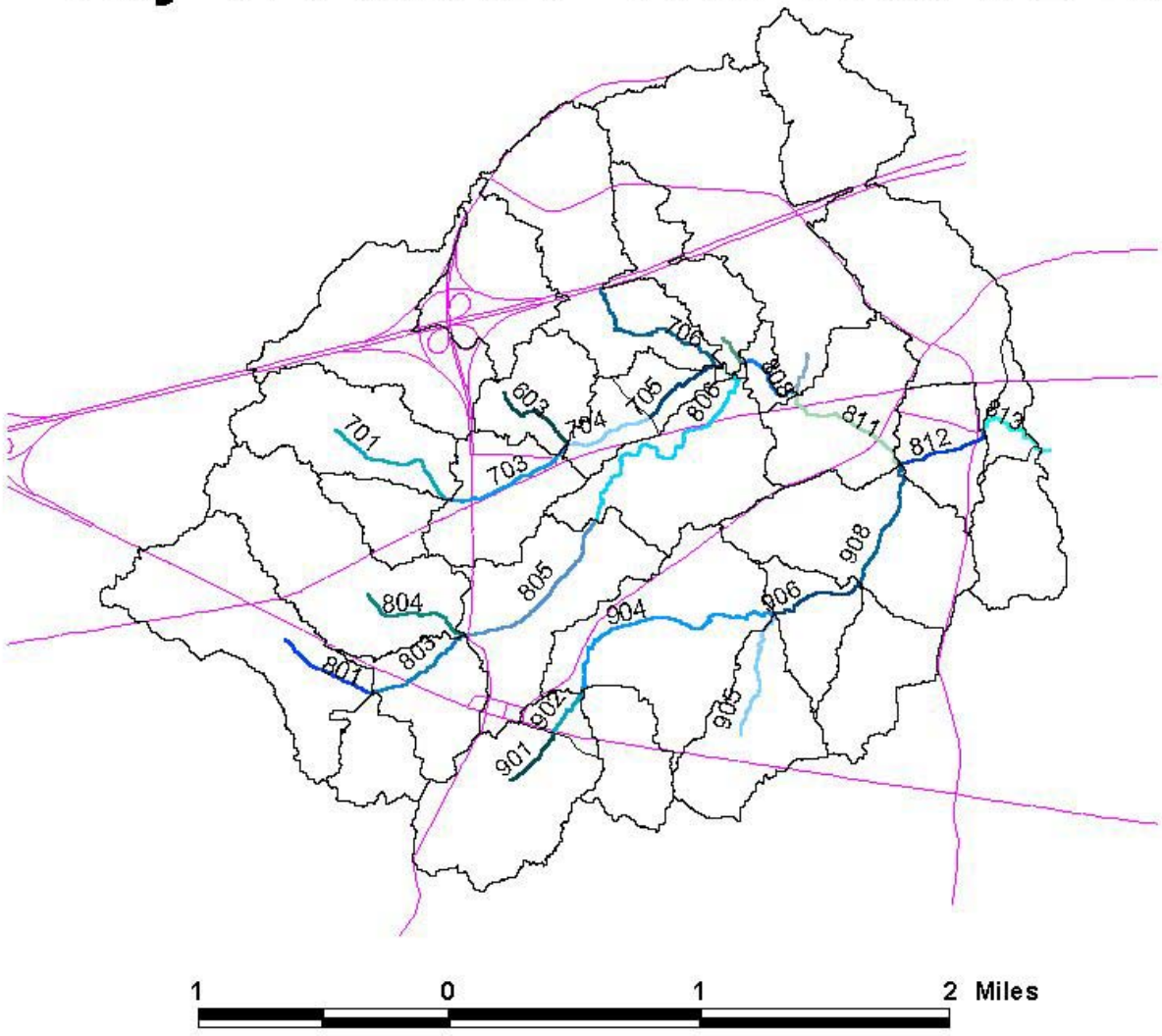
3. Technical Approach Development

- The objectives are to
  - Estimate storm volumes and flows.
  - Identify and rank areas in the City of Fairfax with high runoff volumes
  - Identify potential impacts on the stream reaches.
- Use of hydrologic model to estimate the volume of runoff and peak flow.

Storm Runoff Estimation

- Use the EPA Storm Water Management Model (SWMM)
- Use 10 years of rainfall data (1990 to 2000)

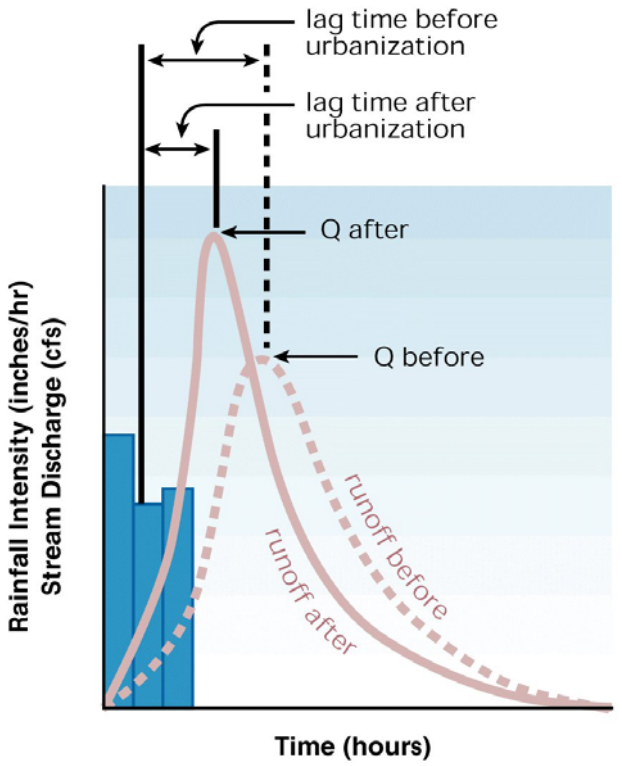
City of Fairfax - Watershed Delineation



Fundamental Questions

1. Is it possible to achieve the required stormwater volume reduction?

2. Can reducing the volume of stormwater runoff eliminate stream degradation?



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Stormwater Control

- Retrofitting of existing sites
- Control Measures:
  - Structural control
    - Detention basins
    - Infiltration
    - Bioretention
    - Wetlands
  - Non-structural controls
    - Density restrictions
    - Buffer zones
    - Low impact development (LID)
- Implementation of site specific and regional stormwater controls

Next Steps….

- Calibrate the stormwater model
- Estimate the runoff volumes
- Develop criteria and weighting factors for screening of subwatersheds
- Potential BMP sites

Discussion

City of Fairfax WMP

- Goals and objectives:
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